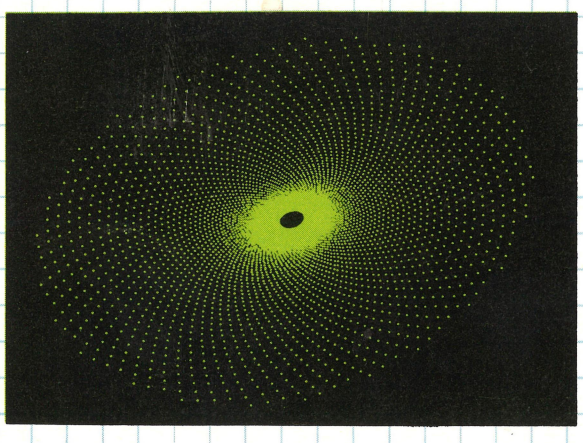
FIRST IN.....



CREATIVITY

RESOLUTION

INTELLIGENCE

INDEPENDENCE

MicroAngelo™ is an intelligent, high resolution graphics display capable of drawing crisp character or graphic images at high speed on standard television monitors. Its onboard microprocessor makes it completely independent, supporting its own RAM and PROM, I/O ports, interrupt structure, real time clock, light pen interface, and resident software. Because of its self-reliant architecture, MicroAngelo places *no load on the host computer,* allowing your system to work in parallel with this powerful and intelligent graphics system.

MicroAngelo produces very high quality black and white images. In the second quarter of 1980, SCION Corporation will introduce the **Palette,**™ an S100 bus board capable of accepting video output from up to eight MicroAngelos and producing vivid color and gray scale displays. The Palette will treat MicroAngelos operating in tandem as independent 512 by 484 pixel bit-planes for enhanced graphics, image manipulation or multiple overlays.

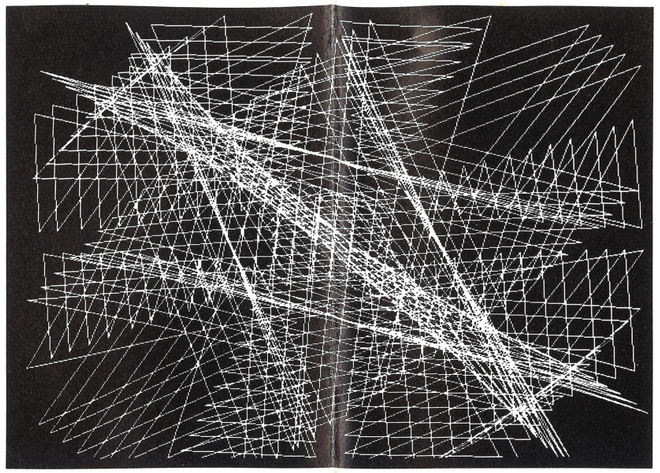
With the **MicroAngelo High Resolution Graphics Subsystem** we introduce the next generation of intelligent, modestly priced refreshed raster scan graphics peripherals. A 512H by 484V resolution display supervised by its own 4 or 5 Mhz Z80 microprocessor incorporates several innovative engineering concepts that greatly enhance display performance.

- Dual Port Memory: Display memory accesses are interleaved with the CRT refresh cycles. The result is a completely undisturbed image with very high speed display memory updating.

- High Speed Vector Generation: Vectors can be drawn at a rate of more than 20,000 pixels per second.

- Fast Screen Load and Dump: The entire quarter million pixel screen image can be loaded or dumped with full handshaking in less than 600 milliseconds.

- Bus Isolation: MicroAngelo has its own CPU, memory, I/O ports, and bus structure, eliminating any load on the host computer. Since MicroAngelo is isolated and *not* DMA'ed, your CPU operates at full speed, and without sacrificing host computer address space.



Onboard MicroAngelo Screenware™

Software is available at several levels, suitable for applications from general purpose to scientific and business graphics. And since MicroAngelo has its own CPU, the bulk of the software is in the device itself, not in the host computer.

The **Host Resident Terminal Software** (HRTS) transforms a computer into a high quality graphics terminal. Once executed, HRTS self-relocates to the upper bound of the CP/M operating system user area and will allow any applications package subsequently run to have the full benefit of a graphics terminal command language.

Host Computer Memory Map

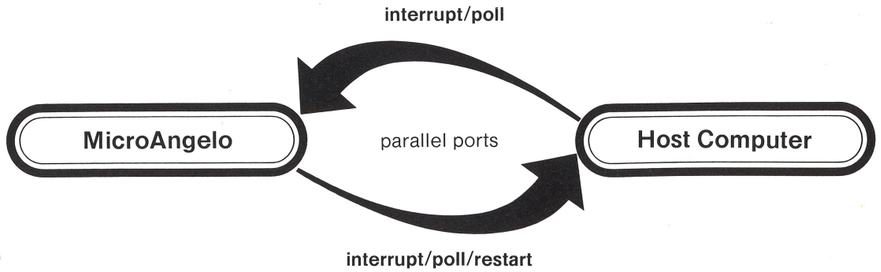
HRTS Modules:
- MicroAngelo Graphics Subsystem keyboard handler
- serial port handler (8251, 2651, and user-defined USARTS)
- instance (define, build, edit, and recall objects)
- high level language interface (FORTRAN, PILOT, BASIC, etc.)
- enhanced cross hair usage (includes rubber-band lines)

Direct HRTS commands can be given from the MicroAngelo graphics subsystem ASCII keyboard which has the convenience and familiarity of a Selectric, plus the flexibility needed for a powerful graphics terminal. Twenty graphics keys control specific functions and concurrently allow up to 16 user-defined command sequences.

Screenware™ **Pak I** is software resident in PROM on the MicroAngelo board. It offers standard CRT emulation and a basic graphics package, including

draw point	draw line	draw rectangular region
erase point	erase line	erase rectangular region
complement point	complement line	complement rectangular region
read point	dump screen	restart MicroAngelo
plot graphic	load screen	cross hair on
plot ASCII	read light pen	cross hair off

Communication with MicroAngelo is through its own parallel ports, useable in a polled or interrupting environment. In either mode, communication channel efficiency is high; MicroAngelo informs the host computer when "busy" and "idle".



MicroAngelo-Host Computer Communication

Screenware Pak II (optional) is a MicroAngelo firmware replacement which extends the capability of Screenware Pak I. In addition to full buffering of all data and commands, Screenware Pak II allows separate, user-definable regions for graphics and ASCII data. Further, MicroAngelo becomes completely interrupt driven, and with more commands:

draw circle	select status area
draw curve	read real-time clock
select terminal region size	set real-time clock
select graphics region size	display real-time clock
select scroll characteristics	fill polygon
define inter-character spacing	erase polygon interior
define inter-line spacing	complement polygon interior

More detailed technical information is available in the MicroAngelo High Resolution Graphics Board and MicroAngelo High Resolution Graphics Subsystem manuals.
SCION CORP.—8455-D Tyco Rd., Vienna, Va. 22180 703-827-0888.

RELATED PRODUCTS, Coming Soon:

HARDWARE: The Palette mixer board for use with up to eight MicroAngelos to create vivid 512H by 484V resolution color displays, programmable color lookup table with 256 on-screen colors selected from more than 16.7 million combinations, and per pixel blinking between two colors.

SOFTWARE: Emulation software for Tektronix 4027 and Ramtek 6000 color graphic terminals, Palette features that include color select, alternating or cyclic color blinking, fade-in, and fade-out.

TECHNICAL SPECIFICATIONS

MicroAngelo Board

- —single, high quality S-100 board
- —512H x 484V resolution
- —Z80 driven at 4 or 5Mhz (jumper selectable)
- —32K dual port RAM (30K display, 2K scratchpad)
- —up to 8K PROM (2708, 2716)
- —alphanumerics: normal—5 x 8 pixels; double—10 x 16 pixels, underlying field size of both is user programmable
- —60 Hz interrupting real-time clock
- —vertical resolution jumperable to 448 (28K display, 4K scratchpad)
- —light pen interface: power, actuation, data strobe
- —S100 interrupt structure jumperable to any of 8 vectored lines
- —standard RS-170 composite or direct drive video output
- —external sync provision
- —signals available at board connector (all can be generated or received except TTL video): 20 Mhz clock, HBLANK, /HBLANK, VBLANK, /VBLANK, FIELD, TTL VIDEO.
- —power requirements: 1 amp @ +8v unregulated, 700 ma @ +18v unregulated, 400 ma @ −18v unregulated
- —refresh rate: 30 Hz, interlaced
- —monitor recommendations: minimum 10 Mhz bandwidth, P39 phosphor

Subsystem Software

- —Host Resident Terminal Software, CP/M compatible
- —Screenware Pak I, included with MicroAngelo, on PROMS
- —Screenware Pak II, optional, on PROMS

Monitor

- —15 inch screen
- —20 Mhz bandwidth
- —P39 (green) phosphor
- —dynamic focus
- —horizontal resolution 1000 lines
- —etched non-glare glass faceplate

Keyboard

- —52 keys plus 20 graphic command keys
- —IBM Selectric layout
- —n-key rollover
- —LED electronic shiftlock
- —8 foot coiled cabling
- —tactile feedback

Host Requirements for MicroAngelo High Resolution Graphics Subsystem

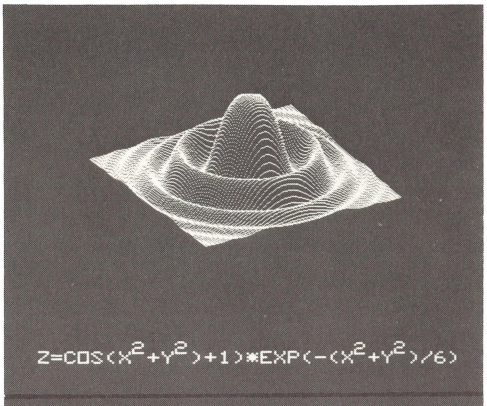
- —parallel input port for MicroAngelo Subsystem keyboard: 8 data bits, positive going strobe, +5 volts regulated (100 ma load), ground
- —S100 slot (adaptable to other bus structures, see Tech Note MA348)
- —50/60 Hz, 220/110 volt compatible

SCION CORPORATION
8455-D Tyco Road
Vienna, Va. 22180
703-827-0888

MICROANGELO™

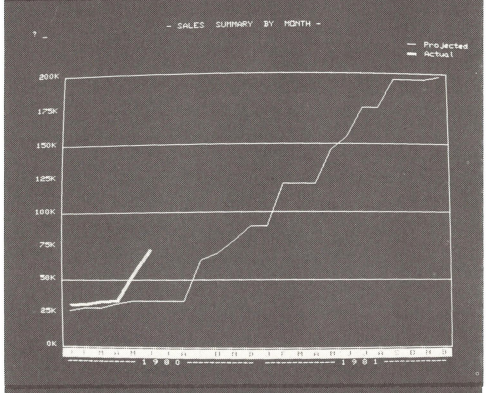
HIGH RESOLUTION GRAPHICS SINGLE BOARD COMPUTER

by
SCION

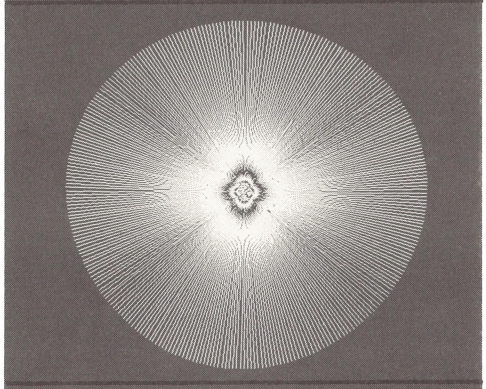


Science

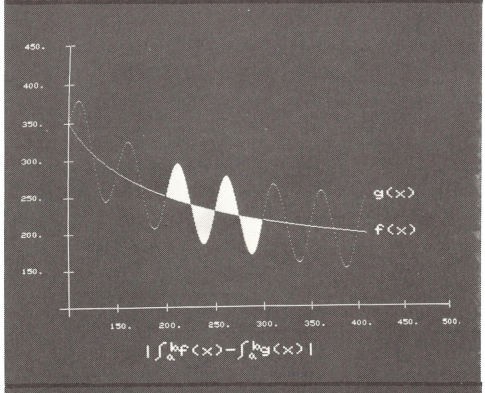
MicroAngelo™ 512h by 480v point resolution intelligent graphics display board for the S100 computer market



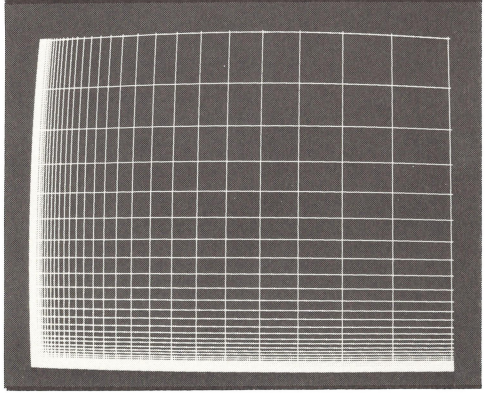
Business



General



Education



Industry

MicroAngelo

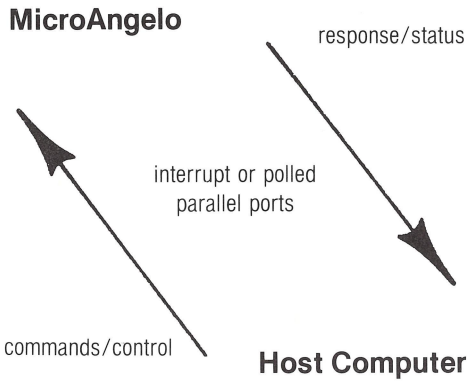
MicroAngelo™ is an intelligent, high resolution graphics display capable of drawing crisp character or graphic images at high speed on standard television monitors. Its onboard microprocessor makes it completely independent, supporting its own RAM and PROM, I/O ports, interrupt structure, real time clock, light pen interface, and resident software. Because of its self-reliant architecture, MicroAngelo places *no load on the host computer*, allowing your system to work in parallel with this powerful and intelligent graphics system.

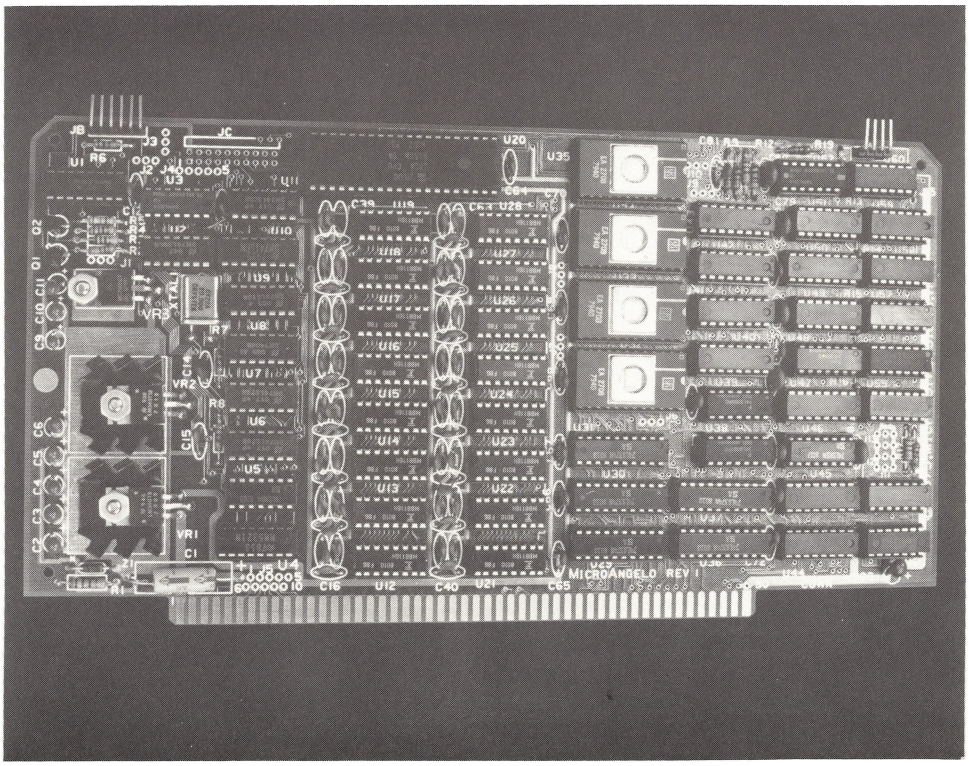
The MicroAngelo™ High Resolution Graphics Board is widely used in education, industry, and CAD/CAM applications and is recognized as the most flexible, high resolution refreshed raster scan graphics board available. A 512H by 480V resolution display supervised by its own 4 or 5 Mhz Z80 microprocessor incorporates several innovative engineering concepts that greatly enhance display performance.

- Dual Port Memory: Display memory accesses are interleaved with the CRT refresh cycles. The result is a completely undisturbed image with very high speed display memory updating.
- High Speed Vector Generation: Vectors can be drawn at a rate of more than 20,000 pixels per second.
- Fast Screen Load and Dump: The entire quarter million pixel screen image can be loaded or dumped with full handshaking in less than a second.
- Bus Isolation: MicroAngelo has its own CPU, memory, I/O ports, and bus structure, eliminating any load on the host computer. Since MicroAngelo is isolated and *not* DMA'ed, your CPU operates at full speed, and without sacrificing host computer address space.

Communication with MicroAngelo is through its own parallel ports, useable in a polled or interrupting environment. In either mode, communication channel efficiency is high; MicroAngelo informs the host computer when "busy" and "idle".

MicroAngelo-Host Computer Communication





Graphics Board

Software

To support diverse applications, SCREENWARE PAK I gives MicroAngelo a responsive interrupt-driven operating system with fully buffered I/O: PAK I resides in 4,096 bytes of on-board read only memory and offers terminal emulation, as well as a sophisticated graphics package. Possible formats for callable routines include

POINT("Draw",X,Y)
POINT("Erase",X,Y)
POINT("Compl",X,Y)
POINT("Read",X,Y)
LINE("Draw", X1,Y1,X2,Y2)
LINE("Erase",X1,Y1,X2,Y2)
LINE("Compl",X1,Y1,X2,Y2)
REGION("Draw",X1,Y1,X2,Y2)
REGION("Erase",X1,Y1,X2,Y2)
REGION("Compl",X1,Y1,X2,Y2)
SCREEN("Clear")
SCREEN("Load")
SCREEN("Dump")
SCREEN("Compl")
CHAR(tilt,size,light/dark,set1)
SETSCROLL(X)
LIGHTPEN("Read")
CROSSHAIR("Read")
CROSSHAIR("Set",X,Y)
CROSSHAIR("On")
CROSSHAIR("Off")
CHARCURSOR("Read")
CHARCURSOR("Set",X,Y)
GRAPHCURSOR("Read")
GRAPHCURSOR("Set",X,Y)
RESTART( )
USER1(arg1,...,argn,result1,...,resultn)
USER2(arg1,...,argn,result1,...,resultn)
USER3(arg1,...,argn,result1,...,resultn)
USER4(arg1,...,argn,result1,...,resultn)
DEFCHAR(X1,...,Xn)

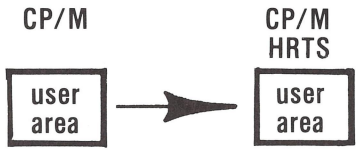
Our HOST RESIDENT TERMINAL SOFTWARE (HRTS) transforms your computer into a powerful graphics terminal. HRTS is available with our MicroAngelo Graphics Subsystem which includes the MicroAngelo Graphics Board, a 72 key detached keyboard, and a high performance 15″ monitor. HRTS is CP/M compatible and once executed, self-relocates to the upper bound of the CP/M operating system user area and will allow any applications package subsequently run to have the full benefit of this terminal command language.

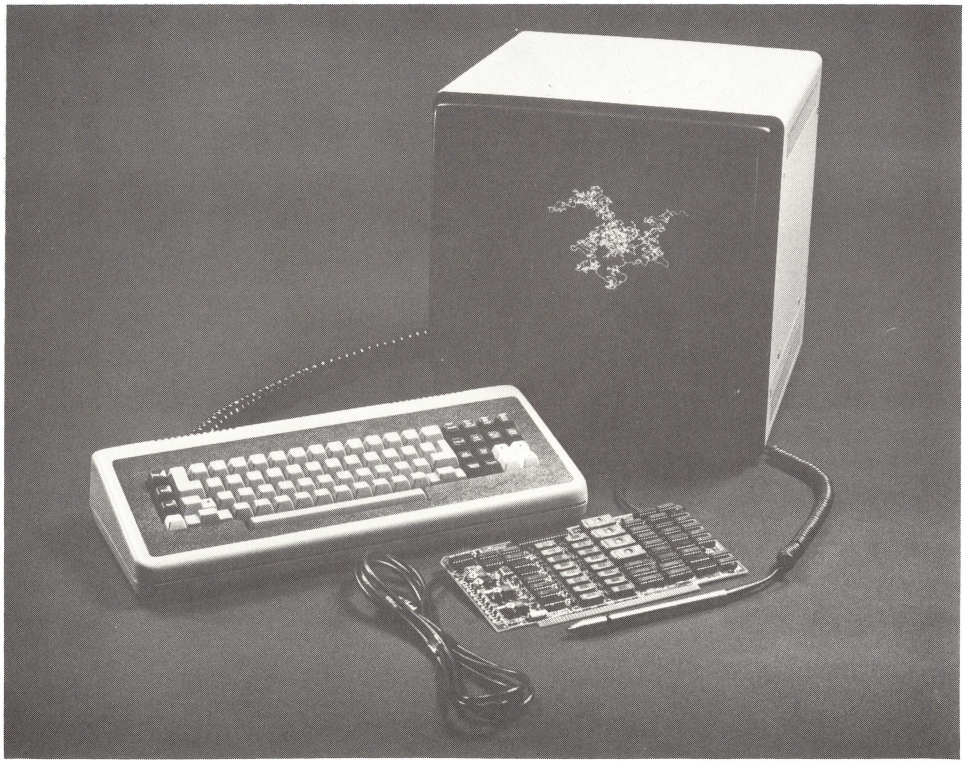
HRTS commands can be given from either the MicroAngelo keyboard, the host-controlled serial line, or from a user program executing in the host.

The MicroAngelo Graphics Subsystem provides all of the alphanumeric and graphics functions normally associated with high cost graphics terminals while performing as your S100 console.

The Subsystem's full-ASCII keyboard has the convenience and familiarity of a Selectric, plus the flexibility needed for a powerful graphics terminal. Sixteen graphics keys control specific functions and concurrently allow up to 16 user-defined command sequences.

Host Computer Memory Map





MicroAngelo Graphics Subsystem

TECHNICAL SPECIFICATIONS

MicroAngelo Board

— single, high quality S100 board (IEEE compatible)
— 512H × 480V resolution
— Z80 driven at 4 or 5Mhz (jumper selectable)
— 32K dual port RAM (30K display, 2K scratchpad)
— up to 8K PROM (2708, 2716)
— alphanumerics: normal—5 × 8 pixels in a 6 × 12 field; double—10 × 16 pixels in a 12 × 24 field; 40 line × 85 character display (normal)
— 60 Hz interrupting real-time clock
— vertical resolution jumperable to 448 (28K display, 4K scratchpad)
— light pen interface: power, actuation, data strobe
— S100 interrupt structure jumperable to any of 8 vectored lines
— standard RS-170 composite or direct drive video output
— external sync provision
— signals available at board connector (all can be generated or received except TTL video): 20 Mhz clock, HBLANK, /HBLANK, VBLANK, /VBLANK, FIELD, TTL VIDEO
— power requirements: 1 amp @ +8v unregulated, 700 ma @ +18v unregulated, 400 ma @ -18v unregulated
— refresh rate: 30 Hz, interlaced
— monitor recommendations: minimum 10 Mhz bandwidth, P39 phosphor

Subsystem Software

— Host Resident Terminal Software, CP/M compatible
— Screenware Pak I, included with MicroAngelo, on PROM

Monitor

— 15 inch screen
— 20 Mhz bandwidth
— P39 (green) phosphor
— dynamic focus
— horizontal resolution 1000 lines

Keyboard

— 56 keys plus 16 graphic command keys
— IBM Selectric layout and sculpted keytops
— n-key rollover
— LED electronic shiftlock
— 8 foot coiled cabling
— tactile feedback

Host Requirements for MicroAngelo High Resolution Graphics Subsystem

— parallel input port for MicroAngelo Subsystem keyboard: 8 data bits, positive going strobe, +5 volts regulated (100 ma load), ground
— S100 slot (adaptable to other bus structures)
— 50/60 Hz, 220/110 volt compatible

Additional technical information is available in the MicroAngelo High Resolution Graphics Board and MicroAngelo High Resolution Graphics Subsystem manuals.

SCION CORPORATION—8455-D Tyco Rd., Vienna, VA 22180
(703) 827-0888 TWX: 710 831-9087

SCION Corporation

March 1, 1981

Item	Comments	Suggested Retail Prices
MicroAngelo™ Graphics Board (MA512)	Single board provides 512x480 monochrome display, MA512 is a component of the MicroAngelo™ Color System.	$1,095 manual $25
MicroAngelo™ Graphics Subsystem (MAGS)	Includes MA512, a 15" monochrome monitor, detached keyboard, and HRTS (Host Resident Terminal Software).	$2,495 manual $50
MicroAngelo™ Color System 2-8 (MACS/2-8)	See below	see below manual $50
Screenware™ Pak II	Each additional 2716 PROM set for use in a Color System is $40.	$ 400 MA512 manual
TEKEM™: Tektronix 4010/4014 Emulator	CP/M* compatible software, requires one MA512. Portion of manual available upon request, at no charge.	$ 400
MicroAngelo™ Monochrome Monitor (15")	20 Mhz bandwidth, P39 (green) phosphor. Sold only with MAGS.	$ 895
MicroAngelo™ Color RGB Monitor (13")	25 Mhz bandwidth, RGB. Sold only with Color Systems.	call for price, availability
Wordsmith™ Video Subsystem (WVS)	Includes Wordsmith™ software, Screensplitter™ video board, a 15" monochrome monitor, and detached keyboard.	$1,795 manual $50

MicroAngelo™ Color Systems

Item	Configuration	Simultaneous On-Screen Colors	Available Color Choices	Price with SW Pak I	Price with SW Pak II
MicroAngelo™ Color System 2 (MACS/2)	Palette+ 2 MA512	4	16.8 mil.	$2,495	$2,935
MicroAngelo™ Color System 3 (MACS/3)	Palette+ 3 MA512	8	16.8 mil.	$3,495	$3,975
MicroAngelo™ Color System 4 (MACS/4)	Palette+ 4 MA512	16	16.8 mil.	$4,495	$5,015
MicroAngelo™ Color System 5 (MACS/5)	Palette+ 5 MA512	32	16.8 mil.	$5,495	$6,055
MicroAngelo™ Color System 6 (MACS/6)	Palette+ 6 MA512	64	16.8 mil.	$6,495	$7,095
MicroAngelo™ Color System 7 (MACS/7)	Palette+ 7 MA512	128	16.8 mil.	$7,495	$8,135
MicroAngelo™ Color System 8 (MACS/8)	Palette+ 8 MA512	256	16.8 mil.	$8,495	$9,175

March 1, 1981

MicroAngelo™ Color System

The MicroAngelo™ Color System is based on the widely used MicroAngelo™ MA512 high resolution S-100 graphics board. In the Color System an additional S-100 board - the Palette - puts out standard RGB signals providing a 512h x 480v resolution color graphics image. The Palette uses a color look-up table which provides up to 256 colors displayed simultaneously onscreen from a range of 16.8 million colors. The MicroAngelo™ Color System requires from 2 MA512 boards (which will generate 4 colors) to 8 MA512 boards (which will generate the maximum 256 colors). The Color System always provides 512 x 480 resolution, and always offers 16.8 million possible colors. The Color System is completely upward compatible with no modifications necessary. The more MA512 boards you have in your parallel combination, the more colors and sophisticated overlay capabilities become available to you.

The Palette board's color look-up table is user-programmable, providing the user with complete control over selection of colors to be displayed. The individual bit planes create entries into a table instead of providing signals to the RGB monitor itself. Thus, values in this table can be set by the user at any time, determining the RGB intensity going to guns of the color monitor. The color look-up table provides enormous flexibility in direct manipulation of colors and intensity. For example, colors can be changed while an image is being created or after the image is complete, similarly, intensity can be altered providing complete fade-in/fade-out capability. The color look-up table in the MicroAngelo™ Color System has 256 entries, with each entry providing one of 256 levels of intensity to each of the three guns, giving 16.8 million hues.

Each individual bit plane of the MicroAngelo™ Color System is microprocessor-controlled. Each bit plane, or group of bit planes, can be enabled (turned on or off), and each individual pixel, vector, or object can be user-defined to blink between any 2 of the colors loaded into the look-up table, from the possible 16.8 million colors. The architecture of the Color System allows the user to draw an image on one group of bit planes, while writing all text on a different bit plane. Each MA512 retains its identity as a plane of information, operating independently from the rest. For example, the user can scroll through text on one board without disturbing the graphics image(s) defined on other boards. These bit plane precedence and overlay technique features create an easy to use, powerful color graphics system.

Color Pak™ I is a three part CP/M* software package that supports the Color System; SCION provides this software FREE (including the source!) to the MicroAngelo™ customer. The first part of Color Pak™ I is the Color Editor. The Color Editor is a highly visual interactive program that assists the user in the creation and selection of colors. The second part, the Palette Editor, is a program that pre-loads the color look-up table with previously selected colors, and facilitates the use of higher level functions such as overlay techniques and bit plane manipulation. The third part, the Resident Color Interface (RCI), is a subroutine library of functions to interface the user's application program(s) to the MicroAngelo™ Color System in a FORTRAN REL format.

The combination of the MicroAngelo™ MA512 graphics board, the MicroAngelo™ Palette board, and Color Pak™ I software creates a powerful and unique S-100 high resolution graphics product -- the MicroAngelo™ Color System.

TECHNICAL SPECIFICATIONS:

Number of MicroAngelo™ MA512 boards: 2-8

Number of MicroAngelo™ Palette boards: 1

Power Requirements:	Each MA512:	+ 8 @ 650 ma
		+18 @ 450 ma
		-18 @ 150 ma
	Palette:	+ 8 @ 1200 ma
		+18 @ 100 ma
		-18 @ 350 ma

Color Signals Generated: RGB direct drive to each gun, RS-170 standard sync supplied both separately and on green.

Color CRT Requirements: 15 mhz @ ± 3 dB response (minimum), slow decay red and green phosphors recommended.

Connector Style. All signals available on single row 1/10th inch spacing header plug, with alternating ground pins.

Additional information is available in the MicroAngelo™ Color System manual from SCION Corporation, 8455-D Tyco Road, Vienna, VA 22180 (703) 827-0888.

March 1, 1981

MicroAngelo™ Tektronix Emulator - TEKEM™

TEKEM™ is a CP/M* compatible object program which emulates a Tektronix 4010/4014 series graphics terminal. TEKEM™ uses the MicroAngelo™ MA512 graphics board for the terminal display, the CP/M* console keyboard for input, and a bi-directional serial I/O port for communications with the external mainframe computer. SCION's MicroAngelo™ Graphics Subsystem in an S-100 computer with one RS-232 serial port satisfies the hardware requirement for TEKEM™. TEKEM™ requires 32k of memory on the CP/M* system.

TEKEM™ is fully Tektronix PLOT-10 compatible, and emulates all standard 4010/4014 features, including:

- Alpha Mode with dual left and center margins.
- Vector modes compatible with either the 1024x780 or 4096x3120 (x,y) grid formats.
- Graphics Input Mode (GIN) complete with light pen or keyboard control of the graphics crosshair.
- Tektronix HARDWARE STRAP options.
- Keyboard selectable Parity, Duplex, and On/Offline mode.
- Terminal RESET and SCREEN ERASE keyboard function keys.

TEKEM™ features which exceed Tektronix 4010/4014 capabilities:

- Alphanumeric text scrolling.
- Selective erase.
- Textured dot-dashed vectors (Tektronix extra cost OPTION 34).
- Disk capture of graphics/text received from host computer while online.
- Offline replay of graphics/text disk files at high speed.

Features not supported:

- Beam defocusing and gray scale.
- Multi-sized hardware text characters.
- Special point plot mode (requires true 1024x1024 drawing area).

*CP/M is a registered trademark of Digital Research Corporation.

March 1, 1981

MicroAngelo™ Screenware™ PAK II

Screenware™ PAK II is a powerful upgrade to the on-board firmware operating system (Screenware™ PAK I) of the MicroAngelo™ MA512 graphics board. PAK II offers several advanced features generally found only in expensive graphics terminals. PAK II also serves to further reduce the software and CPU overhead on the host system. PAK II implements split screen display, circle generation, complex polygon flood, and relative coordinate operations directly on the MicroAngelo™ MA512.

Screenware™ PAK II significantly improves text processing and terminal emulation. A new high speed Alpha Mode nearly doubles the effective baud rate in terminal emulation mode. A split screen function allows restriction of text operations to a user definable segment of the display. Screen control characters for HOME, Clear to EOL, Clear to EOP, CURSOR UP/DOWN/LEFT/RIGHT and Screen Clear are predefined and can be redefined by the user.

Screenware™ PAK II provides several advanced graphics functions. PAK II permits relative coordinate operations for cursor, vector, point, and region commands. PAK II provides circle generation based on center point and radius. A complex polygon flood algorithm will fill almost any bordered region on the screen. A sophisticated Macro facility allows the user to define and store sequences of Screenware™ commands on MicroAngelo™ RAM, which can be invoked with a single user call.

Other Screenware™ PAK II features include improved screen load and dump protocols, diagnostic test routines, and improved inertial control over the light pen tracking cross.

Additional Screenware PAK II information is available in the MicroAngelo High resolution Graphics Board manual from SCION Corporation, 8455-D Tyco Road, Vienna, VA 22180 (703) 827-0888.

MICRO
DIVERSIONS
INC

8455-D Tyco Road
Vienna, Virginia 22180
(703) 827-0888

ORDER FORM

QUANTITY	PRODUCT DESCRIPTION	UNIT PRICE	AMOUNT
		SUB TOTAL	
		TAX OR TAX #	
		TOTAL	

SOLD TO:		
COMPANY:		
ADDRESS:		
CITY:	STATE:	ZIP:

VISA/MASTER CHARGE	BANK ID:	EXP.:
SIGNATURE	PHONE:	

Product Description
April 1980

SCION CORPORATION

Suggested Retail Prices

MicroAngelo™ High Resolution Graphics Subsystem

A high resolution, 512H by 484V, independent graphics system consisting of the MicroAngelo™ Graphics board, 15 inch high performance display monitor, and 72 key detached keyboard with dedicated function keys. Resident Screenware Pak I software emulates a terminal and offers escape sequences for point, line, region, and variably sized and oriented character generation. Future software extensibility.

$1,995.00
manual only **$ 50.00**
Screenware Pak II **$ 400.00**

Wordsmith™ Video Subsystem

An S-100 video word processing interface which includes the Screensplitter's 40 line by 86 character display on a 15 inch CRT with eye saving green phosphor, 72 key detached keyboard with Selectric layout plus 20 dedicated Wordsmith function keys, and Wordsmith Word Processor software.

$1,595.00
manual only **$ 50.00**

MicroAngelo™ High Resolution Graphics Board

An independent Z80-based S-100 single board graphics computer featuring 512H by 484V resolution, high speed communication with the host over interrupting or polled parallel ports, flexible bi-directional handshaking, 32K RAM, sockets for up to 8K of ROM (2708/16), 60 hertz interrupting real time clock, dual port memory for a completely undisturbed display, light pen interface (includes power, actuation, and data strobe), S-100 interrupt structure jumperable, composite or direct drive video output, and resident Screenware Pak I terminal emulator software including point, line, region, cross hair, and variably sized and oriented character generation.

$1,095.00
manual only **$ 25.00**

Screensplitter™ Video Module

40 lines of up to 86 characters per line display, programmable character generator, 1K bytes of subscreen control software to segment the display into any number of logically distinct I/O regions, 4K of static display memory, composite and direct drive video output, and a selection of esthetically designed fonts. S-100 based.

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A fully reentrant page-oriented, random access editor/document processor for 8080/Z80-based systems. The Wordsmith™ features extensive block manipulation capabilities, instantaneous formatting and justification, modular hardcopy drivers, template generation and recall, multi-file cut-and-paste, automatic word wrap, informative status lines, and understandable commands. It's powerful, flexible, and simple to use. CP/M®, North Star DOS, CDOS, and IMDOS compatibility.

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A 15 inch high resolution (20 Mhz) CRT enclosed in an attractive beige and black cabinet. The eye saving green phosphor, automatic focus adjustment, and anti-glare etched glass are standard.

$895.00

SCION Corporation, 8455-D Tyco Road Vienna, Virginia 22180 (703) 827-0888

SCION CORPORATION

7 March 1980

Thank you for your interest in the MicroAngelo High Resolution Graphics Subsystem. Enclosed is the literature and price list that you requested. If you wish more specific or technical information, you are invited to obtain the MicroAngelo manual, at $25.00 plus postage and packaging (creditable toward purchase of the board or subsystem).

Please note the following availability schedule:

Product	Availability
MicroAngelo Graphics Board	from stock
MicroAngelo Manual	from stock
MicroAngelo TV Monitor	from stock
MicroAngelo Graphics Subsystem	June 1980

James L. Mather
Sales Manager

CPM format

8455-D Tyco Road, Vienna, Virginia 22180
(703) 827-0888

Product Review

The MicroAngelo Video Display

Mark Dahmke
1515 Superior St
Lincoln NE 68521

Introduction

The MicroAngelo high-resolution raster graphics display stands well above other S-100 graphics displays in its price and performance range. Since the MicroAngelo is actually a single-board microcomputer, a great number of functions that previously had to be performed by the host computer are now done in *firmware* on the graphics board. Rather than using the memory-address space of the host as a graphics display buffer (32 K bytes in this case), the host communicates with the MicroAngelo through two parallel ports with simple yet powerful commands. The MicroAngelo decodes these commands and automatically performs the desired functions independently of the host processor. With this parallel-processing capability, system response time is greatly enhanced.

Hardware Overview

The MicroAngelo consists of a Z80A microprocessor with 32 K bytes of on-board programmable memory and 4 K bytes (expandable to 8 K bytes) of PROM (programmable read-only memory) firmware. The board contains all hardware necessary to generate a 512 by 480 dot black-and-white display for a television monitor (10 MHz bandwidth or greater). The board communicates with the host through two parallel ports which may be addressed to any of eight blocks of ports from hexadecimal 00 to F0. The video monitor may be connected via composite video (RS-170 standard) or direct-drive transistor-transistor-logic-level video, horizontal and vertical synchronization.

The MicroAngelo has four possible interrupt sources: data from host, data to host, light pen, and 60 Hz timer. Whenever a data byte is sent by the host or the host reads a data byte sent to it, an interrupt will occur in the MicroAngelo. An interrupt will occur when the light pen is fired and also when the timer produces a pulse. Of these four possible interrupts only the data from host and light pen sources is usually enabled.

At a Glance

Hardware: *MicroAngelo high-resolution graphics display.*

Use: *High-resolution raster-scan graphics display which may be used to draw character or graphics images on a standard television monitor.*

Manufacturer: *Scion Corporation*
8455-D Tyco Rd
Vienna VA 22180
(703) 827-0888

Price: *The MicroAngelo graphics board and firmware (the S-100 board only) is $1095. Also available is the Graphics Subsystem which includes the MicroAngelo S-100 board, a graphics keyboard (IBM Selectric-style keyboard with some special function keys) and a high-resolution 15-inch monitor. Cost: $2495. A light pen is optional.*

Features: *The MicroAngelo S-100 board generates a 512 by 480 dot black-and-white raster display. Communication between the MicroAngelo and the host computer is facilitated by two parallel ports. The MicroAngelo also has a dumb terminal emulation mode.*

Firmware: *PROM (programmable read-only memory) firmware is provided on-board the MicroAngelo. High-level commands may be sent via parallel ports. Such functions as "turn on dot" or "draw vector" are implemented by single commands. The on-board Z80 intercepts these commands and performs the desired functions.*

Hardware required: *Any S-100 mainframe computer or any computer which has an S-100 bus adapter. Although the MicroAngelo uses a Z80 microprocessor, the host processor need not be 8080/Z80 compatible.*

Documentation: *An eighty-page user's manual is supplied.*

Audience: *Anyone requiring high-resolution intelligent graphics on a small system.*

A connector is provided for the light pen interface. Several commercially available light pens will work with the MicroAngelo.

Jumper Options

Several on-board jumpers are provided for special applications. For example, it is possible to increase the clock speed of the Z80A microprocessor (and hence the speed of the board) from 4 MHz to 5 MHz, assuming that all the components are capable of operating at that speed. Interrupts (as previously discussed) may be enabled or disabled. The number of visible scan lines may be changed from the default 480 to 448 lines. If this option is chosen, the user is responsible for display management. The PROM sockets may be jumped to either the default 1 K byte per PROM or 2 K bytes per PROM.

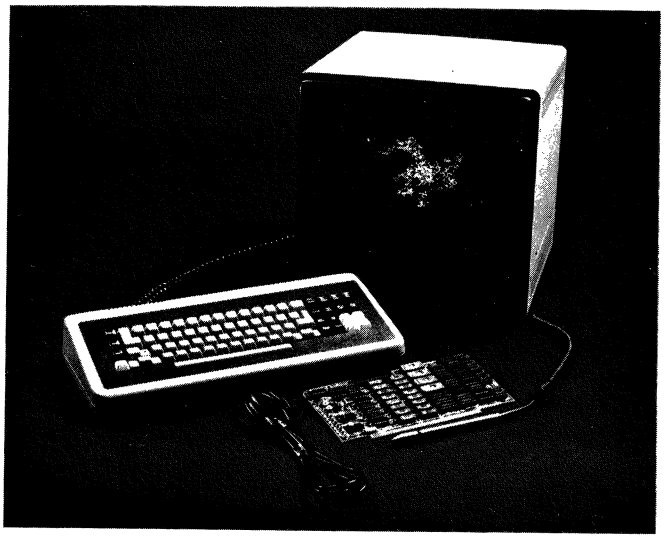


Photo 1: *The MicroAngelo Graphics Subsystem. Included in the subsystem are the MicroAngelo S-100 board, the 15-inch high-resolution black-and-white monitor, and a special keyboard that has an IBM Selectric-style layout plus some special function keys on the far left and right. The light pen is optional.*

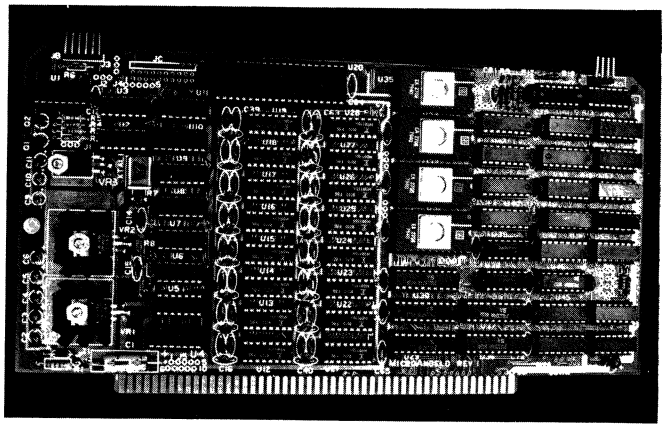


Photo 2: *A close-up of the MicroAngelo S-100 board. The board has a Z80A microprocessor, 32 K bytes of memory, and four 2708 PROMS (expandable to 8 K bytes 2716 PROMs). The board is actually a stand-alone 32 K computer. The video display generates 512 by 480 dots. In the ALPHA mode, up to 85 by 40 characters may be displayed on the screen.*

Adapting-MicroAngelo to Non-S-100 Systems

Since the MicroAngelo uses a simple parallel-port interface to the host system, it may be attached to almost any host system. Data is transferred via the eight parallel input and eight output lines of the S-100 bus connector. Power is supplied through pin 1 (+8 V), pin 2 (+18 V), pin 52 (−18 V), and pin 50 (ground). Address bus lines A7, A6, A5, A4 and pDBIN may be tied permanently high (+5 V); A1 and $\overline{pWR}$ are tied low (ground). A0 is connected to the host to select whether port 0 or 1 is addressed. (MicroAngelo uses two ports.) sINP and sOUT are connected to the host as input-and-output-control command lines. Using this twelve-line interface, the MicroAngelo becomes a stand-alone graphics display device. If interrupts are required, they may be easily added to the above set of signals.

Firmware

The MicroAngelo firmware is what makes the board so powerful. It takes all the work out of designing software and applications programs for the MicroAngelo. The Screenware Pak I is a well-integrated firmware package that allows the board to be used as a terminal emulator, a graphics display, or both.

If a byte is sent to the MicroAngelo (via the parallel port), it is interpreted by the firmware in one of two ways. If bit 7 (the most significant bit) is turned on, the byte is seen as a command. If it is off, the firmware treats it as an ASCII character and passes it to the terminal or ALPHA mode program.

In the text mode, the board will display forty lines with eighty-five characters per line. Text and graphics may be mixed on the screen. In the dumb terminal mode, the firmware will respond to the following control codes: backspace, horizontal tab, line feed, form feed, carriage return, escape, and delete.

Several features are available in the terminal mode. It is possible to display black-on-white or white-on-black characters, for example. Underlining may be turned on and off, and character overstriking may be allowed or disallowed. Two fonts are available, the standard character set or a user-defined font. The winking cursor may be displayed or inhibited, and the scroll mode may be changed. Scrolling may be done on a line-by-line basis, or, to improve response time, block scrolling may be done. Cursor addressing is available — rows run from 0 to 39, columns from 0 to 84. It is also possible to query the firmware to obtain the current cursor location.

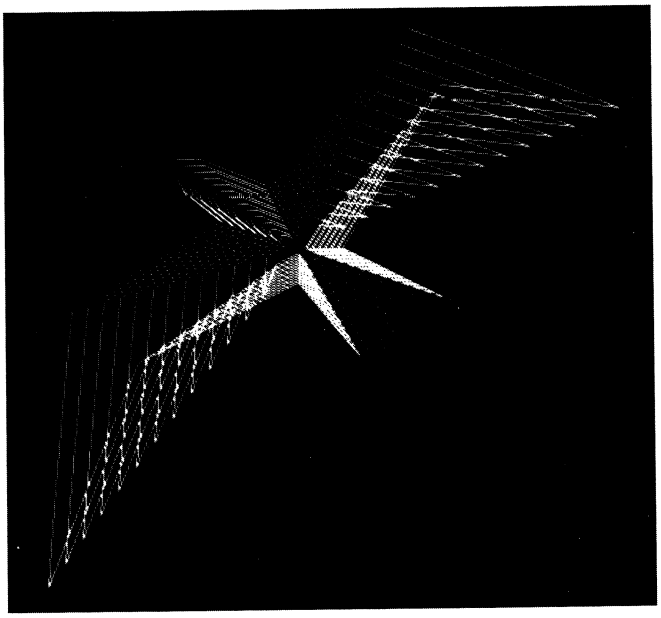
Graphics-Mode Commands

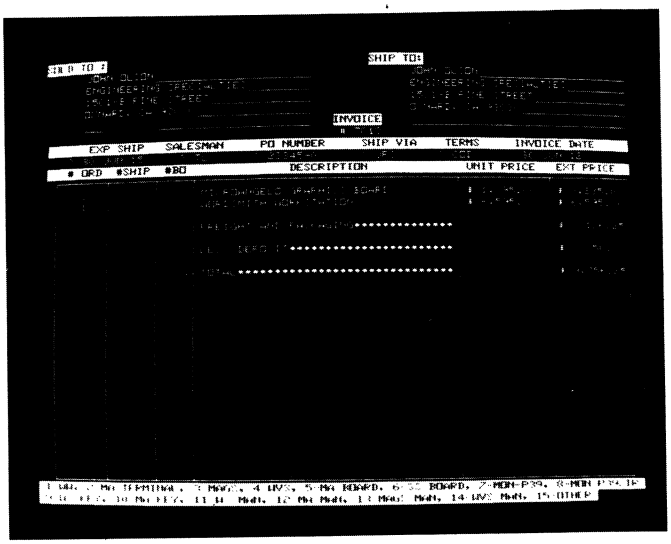
The display may be manipulated in many ways in the graphics mode. First, the graphics cursor may be set to a value, read or queried, or set to the contents of the alpha cursor and vice versa. The format for most graphics-mode commands is:

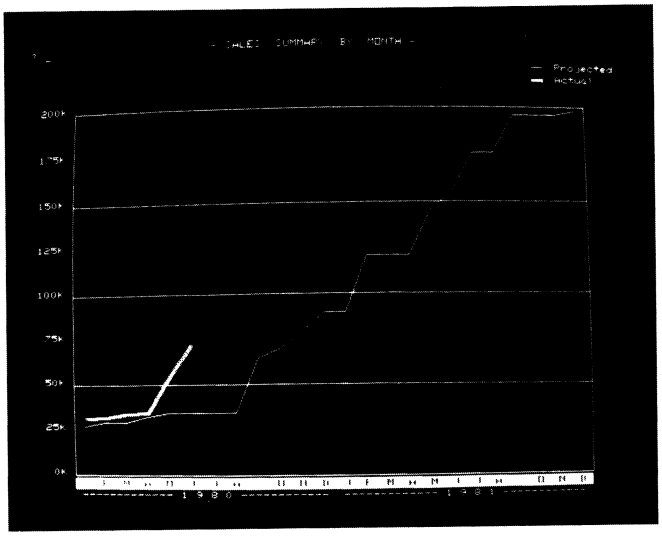
<Command> <xh> <xl> <yh> <yl>

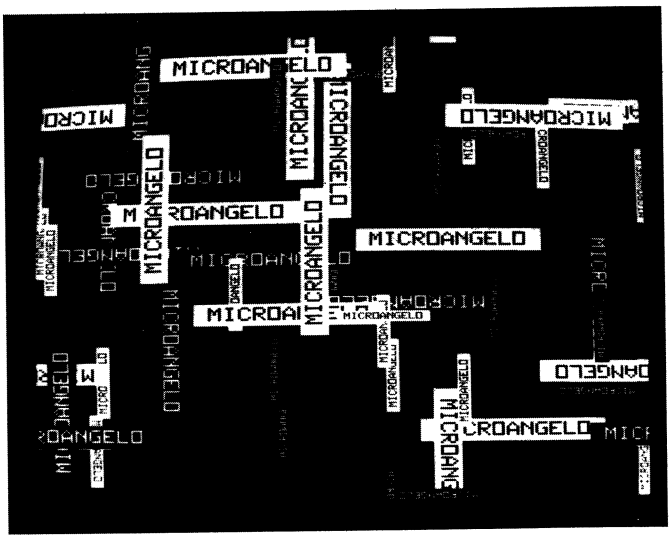
where *xh* and *xl* are the high and low bytes of the X coordinate and *yh*, *yl* are the high and low bytes of the Y coordinate respectively (in hexadecimal). The coordinates (384,256) would be sent as:

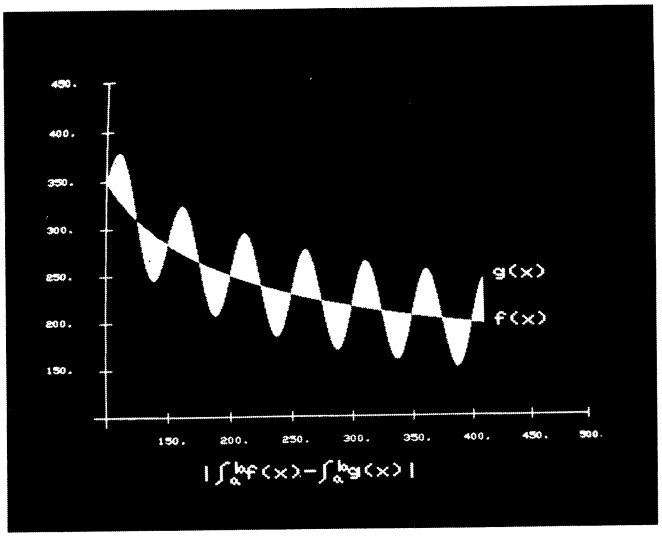
<Command> <01> <80> <01> <00>











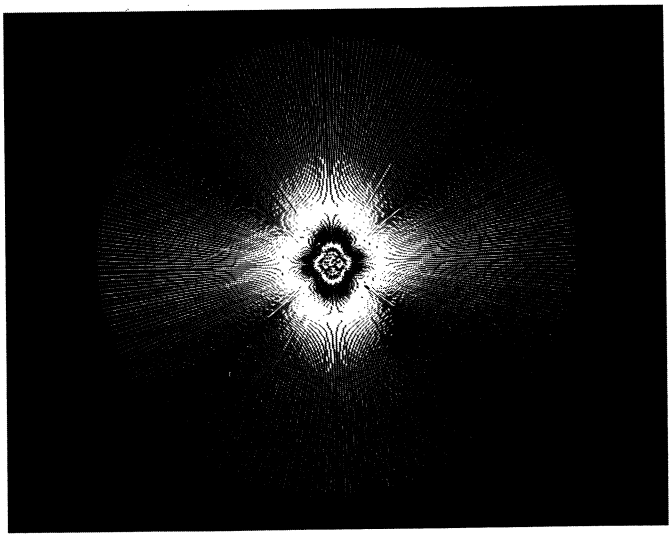


Photo 3a, 3b, 3c, 3d, 3e, 3f: *Sample displays produced with the MicroAngelo graphics board. Vectors may be drawn with single high-level commands.*

Replacing <Command> with <84> would cause the firmware to set the graphics cursor to (384,256) on the screen. Some commands have no operands such as "clear screen". It is possible, with one command, to toggle the screen figure/ground. This means that every dot on the screen will be complemented (ie: reversed). If a dot is *on* (white), it will be turned *off* (black) and vice versa.

Individual dots may be turned on, off, complemented or queried. The form of this group of commands is also:

<Command> <xh> <xl> <yh> <yl>

In the case of the query command, the response is a single byte from the firmware with a value of 1 or 0.

A vector, the next level of sophistication, may also be turned on, off or complemented. The endpoint of the vector is specified in the command, and the starting point is assumed to be the current value of the graphics cursor.

It is also possible to work with *regions* of the display. If we wish to turn on all dots in a box with corners (X1,Y1), (X2,Y1), (X1,Y2), (X2,Y2) the command:

<95> <x1h> <x1l> <y1h> <y1l>
<x2h> <x2l> <y2h> <y2l>

would be sent. Regions may also be turned off or complemented.

Characters may be *plotted* depending on the graphics cursor and the mode selected for graphics characters. Options available include:

- normal-size or double-size characters
- black-on-white or white-on-black
- direction and orientation

Alternate characters may be defined. When the ALPHA mode alternate-character-set option is employed, sending an ASCII character to the firmware will display the alternate character instead of the standard font character. To define the character, the following sequence of bytes must be sent:

<9A> < asc> <s11> <s10>
<s9> ... <s1> <s0>

where 9A is the command, "asc" is the ASCII character code assigned to the character, and s11, s10, ... s0 are the twelve scan lines (6 bits wide) that make up the character in a 6 by 12 dot array.

Using the Light Pen

The light pen provides a convenient means of entering data or drawing on the screen without having to enter numeric coordinates. The coordinates of the pen may be read directly, along with a flag indicating whether or not the pen has been fired since it was last queried. Cross hairs may be displayed at any point on the screen when using the light pen. Another set of commands allows the cross hairs to be displayed, moved, and queried without regard to the light pen.

Memory Uploading/Downloading

Several commands are provided for dumping and loading the screen, thus allowing the user to save images on disk and restore them for later viewing or editing. Memory blocks may be examined or deposited allowing quick loading of alternate character fonts or user-written code. The firmware allows the user to deposit Z80 instructions in unused blocks of on-board memory. The user code may be defined as an op code and thereafter treated as just another firmware command.

Concerning Gray Levels and Color

The one drawback of the MicroAngelo is that it does not have gray levels — meaning the ability to have levels in between black and white or on and off. However, I was informed by Scion that another product, as yet unnamed, is available. This is another S-100 board which mixes the output of three or more MicroAngelo boards to produce *color, gray levels, or both*; four colors can be obtained with as few as two boards. This scheme does require more than one MicroAngelo board, but compared to other graphics displays with 512 by 480 resolution, this approach is still cost-effective. The board does offer interesting possibilities: 256 gray levels, the 256 possible hues or colors, and the winking of dots on an individual dot basis. Also, it is possible to use the winking effect to alternate between two colors.

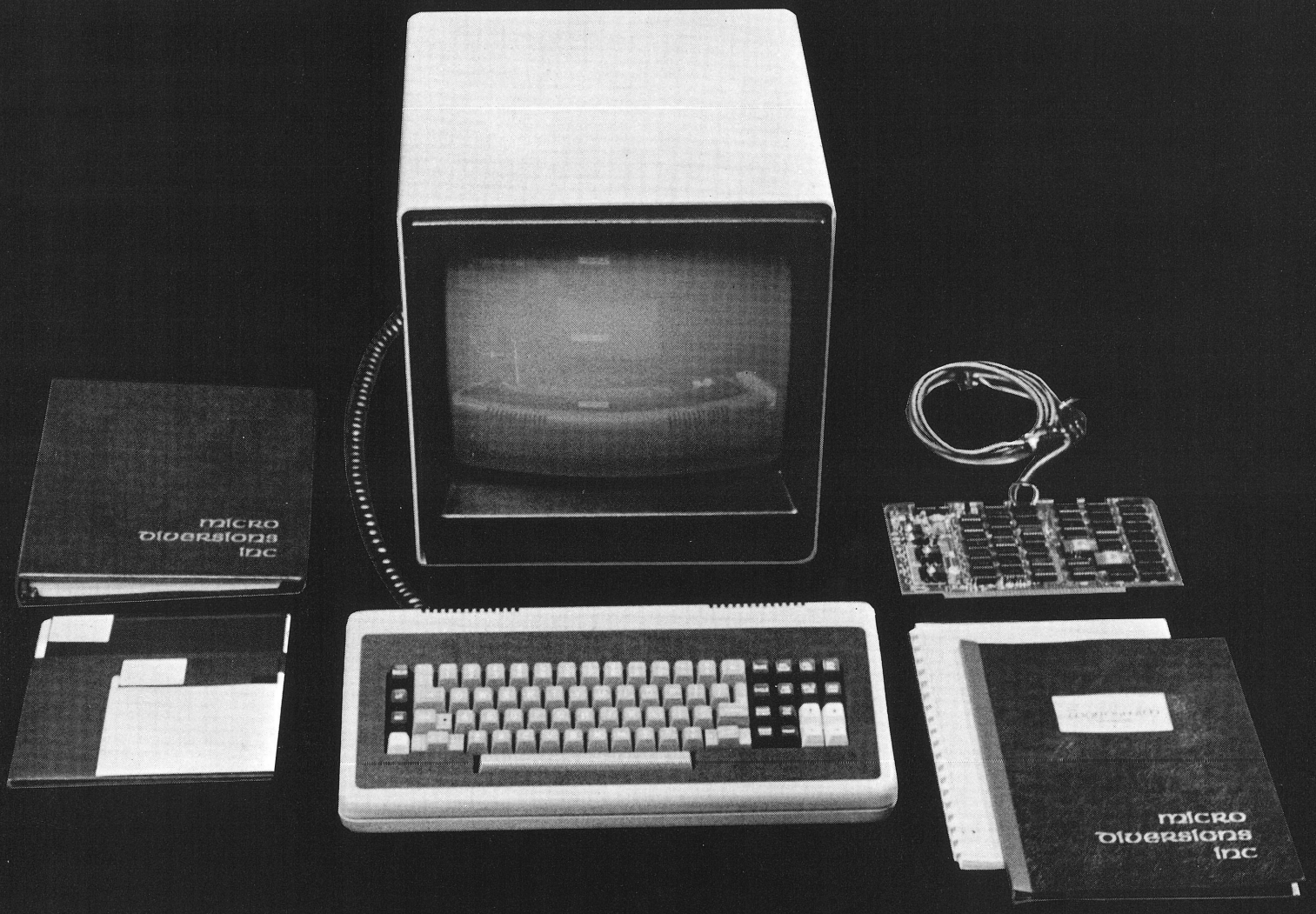
Conclusions

The MicroAngelo video display system provides quality high-resolution graphics capabilities to S-100 bus (or similar) microcomputer systems, with an exceptional price-to-performance ratio.

On-board firmware provides a simple but powerful set of commands that makes system integration easy.

Although the board is designed to run on the S-100 bus, it can be easily adapted to almost any other bus or input/ouput port organization and does not require an 8080 or Z80 host computer. ■

DISCOVER



Isn't it time you moved up?

The Wordsmith Video Subsystem™

The Wordsmith™ Video Subsystem is a professional, high resolution word processing terminal compatible with S100 hosts. It consists of the Screensplitter™ Video Module's huge 40 line by 86 character display, a 15 inch high performance monitor, a 72 key detached keyboard, the Wordsmith Word Processor software, and complete documentation.

The system takes up one slot in your S100 computer, providing high speed memory-mapped performance at a serial terminal price. With the page-oriented Wordsmith Word Processor software you can flip through documents, viewing a page at a time and making changes quickly and easily. Other features include:

- extensive block manipulation capabilities
- instantaneous formatting and justification
- template generation and recall
- multi-file cut and paste
- automatic word wrap
- informative status lines
- understandable commands

The keyboard offers an exact duplication of the IBM Selectric layout, right down to the sculptured keytops and tactile feedback. And we've given the keyboard twenty function keys that provide you with single keystroke control over the more frequently used Wordsmith commands. Also included are the electronic shiftlock with red LED indicator, n-key rollover, and selected automatic key repetition. It's all enclosed in a stylish, color-coordinated vacuum molded case for optimum strength and ease of use.

For the monitor, we chose from the best available, the Ball RD-150 and Motorola M4000. Both are high performance (20 Mhz) 15 inch displays that show you crisp, well-defined characters. The eye-saving green phosphor is standard. The monitor is wrapped in an attractive, color-coordinated cabinet.

Compatibility? On the hardware side, we've yet to find an S-100, 8080 or Z80 based host that won't run the Screensplitter Video Module. And the Wordsmith is CP/M, North Star DOS, IMDOS, and CDOS compatible. Output drivers are available for the Diablo, Qume, NEC, or any TTY-like printer.

The Wordsmith Video Subsystem.

A professional quality word processing terminal at a "dumb" price.

Isn't it time you moved up?

Micro Diversions, Inc. 8455-D Tyco Road, Vienna, Virginia 22180 (703) 827-0888